

## **Comparative performance of Pistachio nut fumigation in sealed metal silos using VAPORPH3OS® Phosphine fumigant - Horn diluphos system and aluminum phosphide pellets**

DePalo, M.\*<sup>1</sup>, Christenson, C.<sup>2</sup>, Horn, T.<sup>3</sup>, Glover, S.<sup>4</sup>

<sup>1</sup>CYTEC Canada Inc., 9061 Garner Road Niagara Falls, Ontario L2E 6T4 Canada

<sup>2</sup>CYTEC Industries Inc. 3064 Northridge Lane, Minnesota 55060, USA

<sup>3</sup>Fosfoquim SA, Av. General O'Higgins N° 2165 - Padre Hurtado - Talagante – Chile

<sup>4</sup>Cardinal Professional Products 57 Matmor Road, Woodland, CA 95776, USA

\*Corresponding author, Email: Mike.DePalo@cytec.com

#Presenting author, Email: Mike.DePalo@cytec.com

DOI: xx.xxxx/xxx.2014.xxx.xxx.xxx

### **Abstract**

Pistachio nuts in California are normally stored in metal silos and require fumigation to control insect infestation during storage. Metal silos vary in terms of gas tightness which greatly affects the overall performance of a fumigant and associated gas application method in creating good gas distribution and maintaining the minimum lethal dose. The minimum lethal dose must be maintained throughout the whole fumigation period to achieve 100% mortality of insects present. The commonly used fumigant for treating pistachio nuts in California is the aluminum phosphide pellets with limitations in terms of ability to maintain the minimum phosphine concentration, longer exposure time and flammability risk. With the introduction of VAPORPH3OS® phosphine fumigant in combination with the Horn Diluphos System phosphine/air mixing machine, the limitations encountered with the use of aluminum phosphide tablets can be overcome. VAPORPH3OS® (99.3% phosphine w/w) is a cylinderized gas formulation of phosphine which is commercially used globally for safe, effective and user-friendly fumigation of food and non-food commodities. VAPORPH3OS® is dispensed in any fumigation structure using the Horn Diluphos System (HDS), a dilution machine which blends and delivers pure phosphine and air into a non-flammable mixture. This paper describes the commercial fumigation trials on pistachio nuts comparing the performance of fumigant and gas application methods. The objective was to maintain a minimum of 200 ppm of phosphine for 3 days. Results of the trials showed that the VAPORPH3OS®- HDS technology offers many advantages over the aluminum phosphide pellets in terms of achieving even gas distribution quicker, better control of fumigation with the ability to top up to maintain minimum gas concentration, reducing overall fumigation times and improved safety risk management.

**Keywords:** VAPORPH3OS® phosphine fumigant, Horn Diluphos System, pistachio nuts fumigation, metal silos, aluminum phosphide pellets